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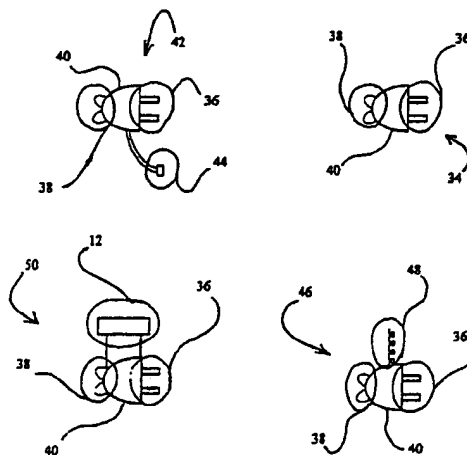
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(54) Title: DEVICE AND SYSTEM FOR ENABLING SIGNAL TRANSMISSION ON EXISTING POWER, DATA AND OTHER CABLE SYSTEMS



(57) Abstract: A Device and System for Enabling Signal Transmission on Existing Power, Data and Other Cable System is disclosed. Also disclosed is a device and system that includes means for interfacing with an electrical power cable system and thereafter wirelessly interfacing with electronic devices to enable communications over the electrical power cable system. The preferred system and device further includes data processor means for configuring and transmitting signals between the electrical power cable system and the wireless system, and may also include means for communicating over and interfacing with telephone and/or cellular telephone systems. The preferred system further includes firewall means for cooperating with the devices of the present invention to prevent unauthorized communications over the system. Still further, the preferred device includes internal power supply means for providing backup or primary power to the device.

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DEVICE AND SYSTEM FOR ENABLING SIGNAL TRANSMISSION ON
EXISTING POWER, DATA AND OTHER CABLE SYSTEMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to data communications systems and, more specifically, to a Device and System for Enabling Signal Transmission on Existing
5 Power, Data and Other Cable Systems.

2. Description of Related Art

As technology becomes continually more accessible to the "common man," the ability to use, store, transfer and otherwise manipulate information has become
10 the focus of most businesses as well as for the individual consumer.

While the conventional method for connecting to one of these information networks has been via cable and wire, as the reliance upon connectivity to information has deepened, the desire to gain such access from mobile or portable devices has strengthened. These portable devices, such as Personal Digital Assistants, hand-held
15 computers, cellular telephones, and even digital cameras are now being connected to each other and to networks via Infrared Data Communications. In fact, it is virtually impossible to purchase a notebook computer today that does not include an Infrared Data Communications assembly resident within it.

The desire for maximized utility for computer and data resources is driving computer users to seek systems that enable the sharing of these resources with other users at other physical locations. Furthermore, portable computers and other portable devices have evolved to include much of the utility of the stationary equipment of yesterday. This proliferation of portable devices and the need for shared resources has created a heretofore unmet need in both home and business consumers -- low-cost local networking systems.

Until now, local network systems typically required the installation of a separate, dedicated communications cabling system throughout the locations where shared resources and other network features are desired. Depending upon the particular site, the cabling system made its installation cost-prohibitive both at its inception, as well as for ongoing modification and maintenance. What is needed is a reliable local network system that is not cost-prohibitive to install or to make changes in response to future needs.

Furthermore, in order to be shared, resources such as printers and other "peripherals" have historically needed to either: (1) receive data from a personal computer via a data cable, or (2) be connected directly to a network "hub" via costly interface modules. Printers and other peripherals should have the native ability to connect to the local (or even wider area) network directly, without the need for an intermediate device for its data control.

SUMMARY OF THE INVENTION

In light of the aforementioned problems associated with the prior systems and devices, it is an object of the present invention to provide a Device and System for Enabling Signal Transmission on Existing Power, Data and Other Cable Systems. The preferred system will include: means for interfacing with an electrical power cable system and thereafter wirelessly interfacing with electronic devices to enable communications over the electrical power cable system. The preferred system and device will further include data processor means for configuring and transmitting signals between the electrical power cable system and the wireless system. The preferred device and system may also include means for communicating over and interfacing with telephone and/or cellular telephone systems. The preferred system may further include firewall means for cooperating with the devices of the present invention to prevent unauthorized communications over the system. Still further, the preferred device may include internal power supply means for providing backup or primary power to the device.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects and features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages, may best be understood by reference to the following description, taken in connection with the accompanying drawings, of which:

Figure 1 is a depiction of a variety of devices connected under conventional power and data system arrangements;

Figures 2A, 2B, 2C and 2D are each depiction's of preferred embodiments of adapters of the present invention;

Figures 3A and 3B are connectivity diagrams between a pair of conventional portable computers utilizing the adapters of the present invention;

Figures 4A and 4B are connectivity diagrams between a conventional portable computer and a printer peripheral utilizing adapters of the present invention; and

Figures 5A and 5B are alternative connectivity diagrams between a pair of conventional portable computers utilizing the adapters of the present invention.

DETAILED DESCRIPTION

OF THE PREFERRED EMBODIMENTS

The following description is provided to enable any person skilled in the art to make and use the invention and sets forth the best modes contemplated by the inventor of carrying out his invention. Various modifications, however, will remain readily apparent to those skilled in the art, since the generic principles of the present invention have been defined herein specifically to provide a Device and System for Enabling Signal Transmission on Existing Power, Data and Other Cable Systems.

The present invention can best be understood by initial consideration of Figure 1. Figure 1 is a depiction of a variety of devices connected under conventional power and data system arrangements. Depicted here are two hypothetical rooms (Room 1 and Room 2) in which are located a variety of common household electronic or electrical appliances. As is common in any habitable structure today, there is an installed electrical power cable system 10 terminated in a plurality of electrical power outlets 12 in each room; there is also an installed telephone communications (telcom) cable system 14, which further terminates in telcom cable outlets 16 in virtually every room in the structure. As shown, conventional telcom sets 18 interface with the installed telcom cable system 14 via a telcom cord 20 operatively connected between a particular telcom set 18 and telcom cable outlet 16.

In the case of a conventional portable computer 22 (or desktop personal computer), it may connect to both the telecom cable system 14 (via a modem) as well as drawing electrical power from the electrical power cable system 10 by interfacing with the cable system 10 at an electrical power outlet 12 via an electrical power cord 24.

5 Similarly, a combined television/world wide web terminal 26 will connect to both the electrical power cable system 10 and the telecom cable system 14. Also, computer peripherals 28, such as the printer shown, connect to the electrical power cable system 10 for electrical power, while receiving data input from the computer 22 via a data cord 30.

A final example is the electric light 32, that connects to the electrical power cable system

10 10 at an electrical power outlet.

As was discussed previously above, should a user desire to share the peripheral 28 with another user under this conventional system, another separate cable system to provide either network data transfer or some type of printer switch appliance and associated cable system must be added. It is these situations that are benefited by the

15 present invention.

Now turning to Figures 2A – 2D, we can begin to understand the value of the present invention. Figures 2A, 2B, 2C and 2D are each depiction's of preferred embodiments of adapters of the present invention. In particular, Figure 2A is a Power/Data Adapter 34, which includes a cable power/data interface 36 that is configured

20 to plug in to an electrical power cable outlet. The Adapter 34 also includes a wireless data interface 38, which may be an infrared, radio frequency or other wireless data transfer system interface. Operatively connected between the wireless data interface 38 and the cable power/data interface 36 is a data processor/transceiver means 40 for passing data

received by the wireless data interface 38 and converting the data into a signal for transmission by the cable power/data interface 36 and into the installed electrical power cable system (as well as the inverse flow direction).

Simply stated, therefore, the adapter 34 of the present invention permits
5 wireless data or other signal transmission from a device, such as a portable computer 22 (see Figure 1) and through an installed electrical power cable system 10 (see Figure 1) to another device, such as another portable computer or a computer peripheral, for example.

Figure 2B describes yet another embodiment of the present invention; it is a Power/Data/Telcom Adapter 42. In this embodiment, an additional interface type is
10 included – a cable telecom/data interface 44 for interfacing with an installed telecom cable system 14 (see Figure 1). This adapter 42 provides the additional functionality of wireless interface to both electrical power cable and telecom cable systems (as well as communications interface between electrical power and telecom cable systems).

Figure 2C depicts yet another embodiment of the present invention; it is a
15 Power/Data/Celcom Adapter 46 for interfacing between IR/RF, electrical power cable, and cellular telephone systems. As such, communications are enabled between wireless, cellular telephone (or other *remote* or *long-range* personal communications systems such as satellite telephone, for example) and electrical power and telecom cable systems.

Figure 2D depicts still another embodiment of the present invention; a
20 Power/Power/Data Adapter 50 that includes a cable power/data interface 36, a wireless data interface 38 and an electrical power outlet 12 (which will also permit data transfer therethrough). As will be discussed below, this embodiment provides additional functionality and flexibility not previously made available.

The reader should appreciate that the four examples presented by Figures 2A – 2D are simply provided for exposition. A wide variety of combinations of other adapter designs are possible, wherein many interface types are combined in a single adapter (e.g. a plurality of wireless data interfaces or cable telcom interfaces in a single
5 adapter).

Now turning to Figures 3A and 3B, we will explore the tremendous power provided by the devices and system of the present invention. Figures 3A and 3B are connectivity diagrams between a pair of conventional portable computers 22 utilizing the adapters of the present invention. In Figure 3A, a first portable computer 22A is in
10 wireless communication 52 with a Power/Data Adapter 34, which is in turn interfacing with the electrical power cable system 10 at an electrical power outlet 12. For the purposes of this example, we assume that there are no telcom cable outlets in the room with the first portable computer 22A. In another room, a second portable computer 22B is in wireless communication 52 with the same electrical power cable system 10 via another
15 Power/Data Adapter 34. The portable computer 22B is further capable of communicating 56 over the telcom cable system 14 via a connection provided by a telcom cord 20 and a telcom cable outlet 16.

In this example arrangement, therefore, the first portable computer 22A can communicate with the second portable computer 22B over an existing cable system.
20 Furthermore, both computers 22A and 22B can make use of the telcom cable system 14 to communicate with other devices. It should be assumed that the adapters 34 and/or computers 22 are capable of identifying themselves over whatever system through which they are attempting to communicate, making the computers truly portable, even in the

middle of ongoing data transfer, so long as there is an adapter 34 (or other embodiment) in each area in which the user desires to move. Also, the cable systems 10 and 14 might be configurable to include "firewalls" or other barricades to prevent "outsiders" from communicating over the cable systems internal to a particular structure. Furthermore, 5 devices may be configured in security groups, where access to certain devices is only permissible for certain other devices (and users), perhaps by password protection or other recognition system. Still further, participating devices and/or adapters may be able to search, locate and identify other devices and/or adapters available for interface.

Figure 3B depicts another computer-to-computer network over systems of 10 the present invention. In Figure 3B, a third portable computer 22C is in wireless communication with a first electrical power cable system 10A. In another room, a fourth portable computer 22D is in wireless communication with a second electrical power cable system 10B (i.e. a system somehow isolated from system 10A). Since both computers 22C and 22D are in wireless communication with Power/Data/Telcom Adapters 44, with 15 each adapter 44 having a telcom cord 20 connected to a telcom cable outlet 16, the two computers 22C and 22D can communicate with one another 56 over the telcom cable system 14. In this manner, computers without conventional modems installed will be able to communicate with one another.

Figures 4A and 4B depict additional flexibility in connectivity provided by 20 the devices and system of the present invention. In Figure 4A, a portable computer 22A is in wireless communication 54 via a Power/Data Adapter 34 and over an electrical power cable system 10 with a peripheral printer 28A that is connected to the system 10 via a Power/Power/Data Adapter 50. Since this particular printer 28A includes a wireless data

interface 38, the printer 28A can communicate either via it's wireless interface, *or* via it's power cord 24. In the case of Figure 4B, while the printer 28B does not include a wireless data interface, it is still able to be addressed by the computer 22B over the electrical power cable system 10.

5 Consideration of Figures 5A and 5B will illuminate still other valuable embodiments of the present invention. Figure 5A depicts communications between a pair of computers 22A and 22B that are not connectable to common installed cable systems. In this example, the first computer 22A is in wireless communication with a Power/Data/Celcom Adapter 46 of the present invention. The Adapter 46 is in cellular
10 communication 58 with a celcom system 60, which of course interfaces with a telcom cable system 14, through which data 56 flows to and from the second computer 22B connected to the system 14 via a telcom interface 44 and a telcom cable outlet 16. In Figure 5B, a third computer 22C is, like the first computer 22A, interfaced with the celcom system 60. Unlike Figure 5A, however, the other computer 22D includes a
15 wireless data interface 38, such that it is able to communicate with a Power/Data/Telcom Adapter 42 that is in communication over the telcom system 14 with the celcom system 60.

 While not yet discussed specifically herein, the reader can imagine how a "Web TV" might be connected and shared over one of the example networks discussed in
20 Figures 3 – 5. Similarly, a "web telephone" set would be accessible and shared by a plurality of users participating in a network described herein. Finally, any or all of the adapters may include an internal battery or other power supply such that they can maintain

their identity and configuration in the event that they are disconnected (either intentionally or accidentally) from an installed electrical power source (i.e. a wall-mounted outlet).

Those skilled in the art will appreciate that various adaptations and modifications of the just-described preferred embodiment can be configured without
5 departing from the scope and spirit of the invention. Therefore, it is to be understood that, within the scope of the appended claims, the invention may be practiced other than as specifically described herein.

CLAIMSWhat Is Claimed Is:

1. A communications adapter, comprising:

cable power and data interface means for interfacing with an electrical power cable;

wireless data interface means for conducting wireless communications; and

data processor and transceiver means, operatively connected to said cable power and data interface means and said wireless data interface means, for configuring and transmitting signal data between said cable power and data interface means and said wireless data interface means.

2. The adapter of Claim 1, further comprising cable telcom and data interface means, operatively connected to said data processor and transceiver means, and wherein said data processor and transceiver means further configures and transmits signal data to and from said cable telcom and data interface means.

3. The adapter of Claim 1, further comprising celcom and data interface means, operatively connected to said data processor and transceiver means, and wherein said data processor and transceiver means further configures and transmits signal data to and from said celcom and data interface means.

4. The adapter of Claim 1, further comprising power and data outlet means, operatively connected to said data processor and transceiver means, and wherein said data processor and transceiver means further configures and transmits signal data to and from said celcom and data interface means, and wherein said power and data outlet means comprises at least one electrical power outlet for providing electrical power to external devices.

5. An improved network system for enabling data communications over an installed electrical power cable system, said electrical power cable system comprising at least two electrical power outlets, said network system comprising:

a first power and data adapter means operatively connected to one said electrical power outlet, for translating incident wireless data signals into outbound first data signals transmitted over said cable system and further for translating incident second data signals transmitted over said cable system into outbound wireless data signals; and

a second power and data adapter means operatively connected to another said electrical power outlet, for translating incident wireless data signals into outbound said second data signals transmitted over said cable system and further for translating incident said first data signals transmitted over said cable system into outbound wireless data signals.

6. The network system of Claim 5, wherein said first power and data adapter further comprises cable telecom and data interface means for translating incident telecom data signals into outbound said first data signals or outbound said wireless data signals and further for translating incident said second data signals transmitted over said cable system or incident said wireless data signals into outbound telecom data signals.

7. The network system of Claim 5, wherein said first power and data adapter further comprises celcom and data interface means for translating incident celcom data signals into outbound said first data signals or outbound said wireless data signals and further for translating incident said second data signals transmitted over said cable system or incident said wireless data signals into outbound celcom data signals.

8. The network system of Claim 5, wherein said first power and data adapter further comprises power and data outlet means for translating incident data signals into outbound said first data signals or outbound said wireless data signals and further for translating incident said second data signals transmitted over said cable system or incident said wireless data signals into outbound data signals.

9. The network system of Claim 5, further comprising firewall means cooperating with said adapters for preventing the said translation of data signals originating from undesired or unknown sources.
10. The network system of Claim 5, wherein said adapters further comprise storage means for storing, retrieving and comparing the identities of the sources of said incident data signals to a group of sources permitted to send and receive data signals over said network system.
11. The adapter of Claim 1, further comprising internal power supply means for providing power to said adapter.

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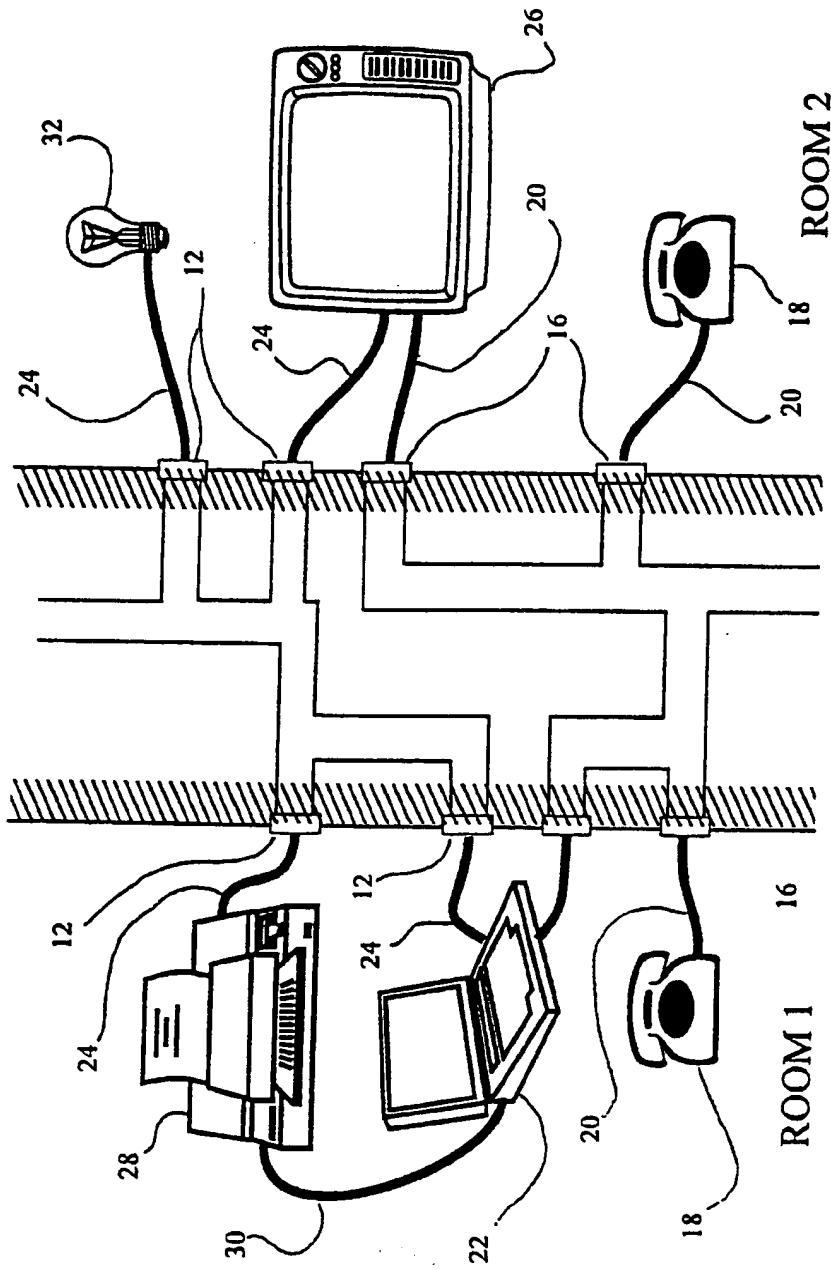


FIGURE 1
PRIOR ART

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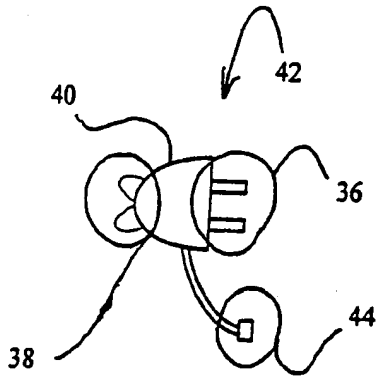


FIGURE 2A

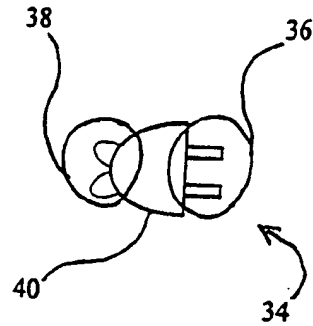


FIGURE 2B

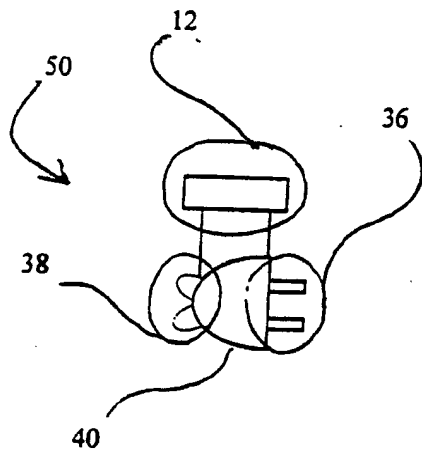


FIGURE 2C

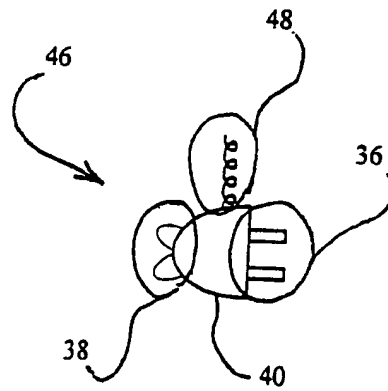


FIGURE 2D

FIGURE 3A

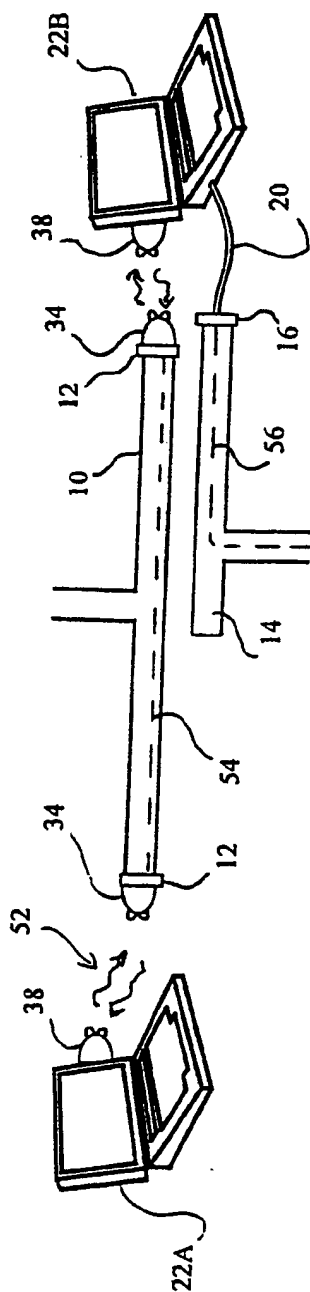
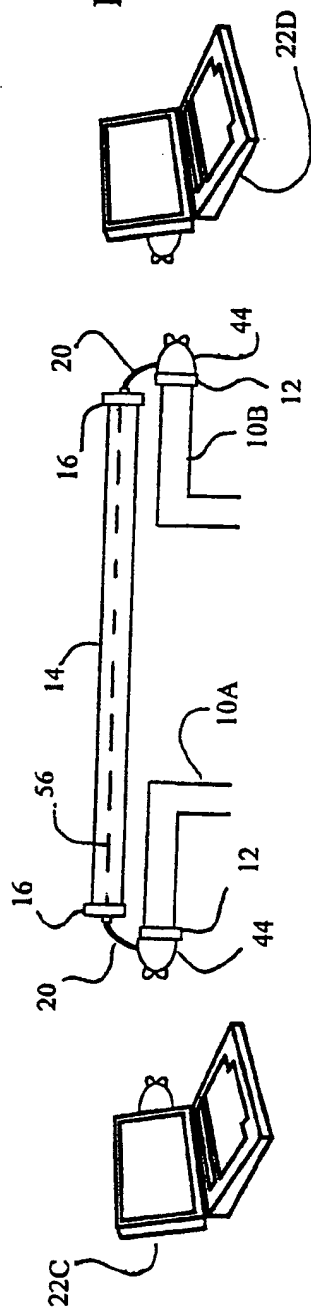


FIGURE 3B



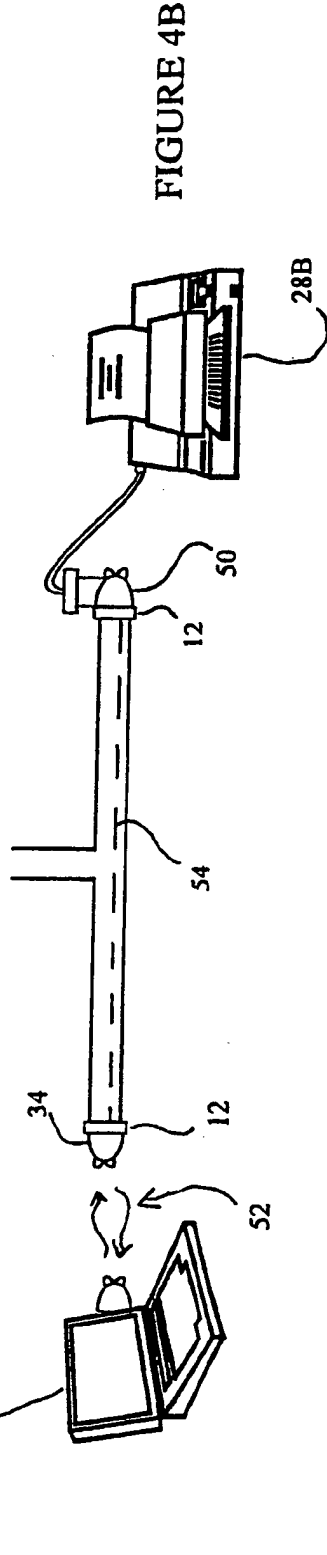
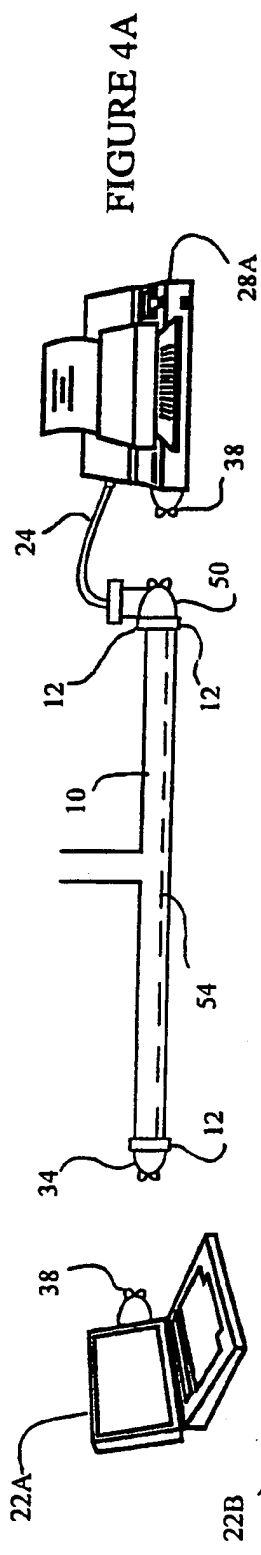


FIGURE 5A

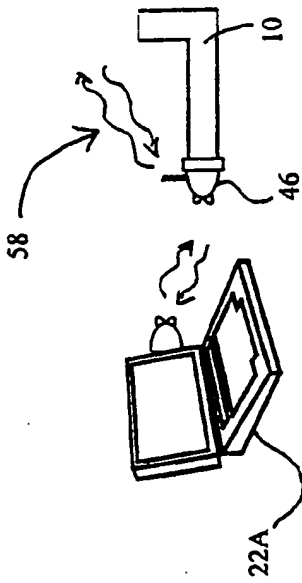
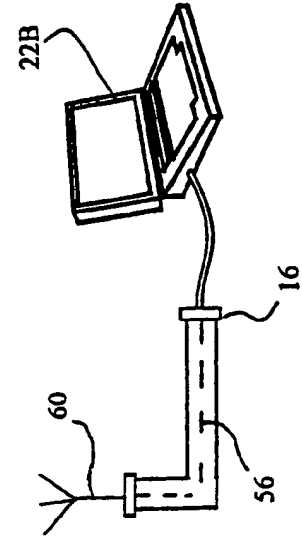
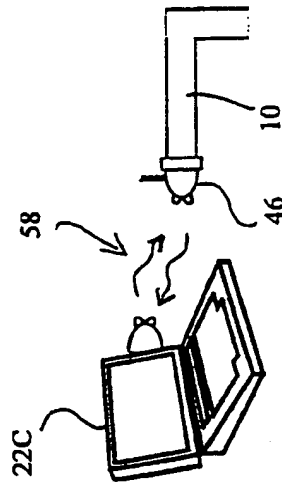
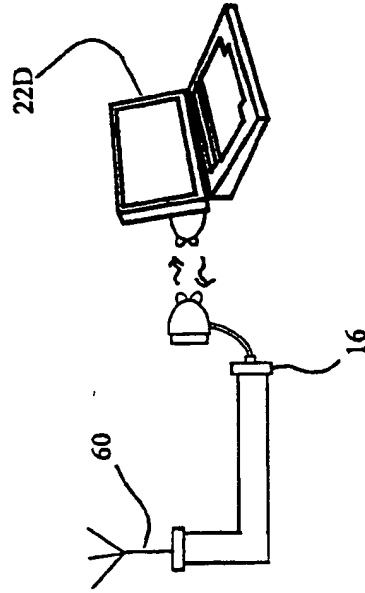


FIGURE 5B



A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H04B3/56		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, PAJ, INSPEC, COMPENDEX, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 127 045 A (CRAGUN DAVID R ET AL) 30 June 1992 (1992-06-30) column 3, line 35 - line 46 column 7, line 1 - line 25 -----	1,2,5,6
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<div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. </div>		
<div style="display: flex;"> <div style="flex: 1;"> <p>* Special categories of cited documents:</p> <p>* "A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>* "E" earlier document but published on or after the international filing date</p> <p>* "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>* "O" document referring to an oral disclosure, use, exhibition or other means</p> <p>* "P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="flex: 1;"> <p>* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>* "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>* "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>* "&" document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search	Date of mailing of the international search report	
15 September 2000	22/09/2000	
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